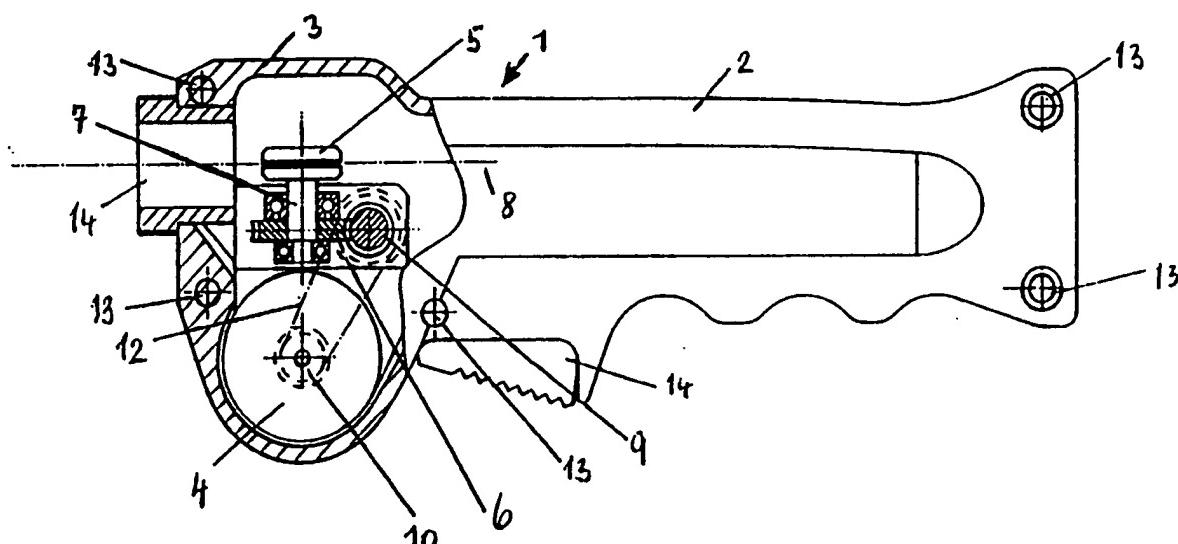




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(54) Title: DRIVE DEVICE FOR PUSH-PULL WELDING TORCHES



(57) Abstract

Drive device for continuously consumable wire electrodes of electric welding torches, comprising a wire drive roller (5) arranged in a housing (1) having a handle (2) and a drive motor acting on the wire drive roller (5) via gearing (6) and arranged outside the wire feed axis, the drive unit consisting of drive motor (4), gearing (6) and wire drive roller (5) being arranged in a housing part (3) formed outside the area of the handle (2) enclosed by the hand. The consumable wire electrode and the supply lines are passed through the handle (2), and the motor shaft (10) of the drive motor (4) is arranged at right angles to the wire feed axis (8).

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Drive device for push-pull welding torches

The invention is aimed at a drive device for so-called push-pull welding torches having continuously consumable wire electrodes.

So-called push-pull welding torches, ie. electric
5 welding torches having a continuously consumable wire electrode, in which the wire electrode is driven and pulled, are known in principle.

US-A-2,719,245 discloses a feeding device for
10 feeding welding wire to welding torches, in which feeding device the handle of the welding gun extends perpendicularly to the feed direction of the welding wire. Arranged laterally next to the handle is the drive unit consisting of drive motor, gearing and wire drive roller, the motor shaft of the drive motor being arranged at
15 right angles to the wire feed axis.

Described in US-A-3,210,522 is a welding gun in
20 whose handle the drive motor of the welding-wire feed unit is arranged. The handle is arranged at right angles to the wire feed axis, and the gearing and the wire drive roller are arranged above the handle in a housing.

However, the disadvantage of the push-pull torches on the market is that they have an unfavorable distribution of weight and often large-sized handles which are difficult to grasp.
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The object of the present invention is to provide a structural design for a drive device for continuously consumable wire electrodes of electric welding torches whose handle is designed to be small and easy to grasp and in which the drive unit is arranged with a well-balanced distribution of weight in a housing part connected to the handle.
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This object is achieved by a drive device for continuously consumable wire electrodes of electric welding torches, comprising a housing having a handle and a housing part arranged outside the area of the handle enclosed by the hand and having a drive unit arranged therein consisting of a wire drive roller and a drive motor acting on the wire drive roller via gearing and arranged outside the wire feed axis in such a way that
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its motor shaft runs at right angles to the wire feed axis, characterized in that the handle is designed to be coaxial to the wire feed axis, and the wire electrode is passed through the handle and the housing part, the motor shaft of the drive motor running in a horizontal plane which is at a distance from the parallel horizontal plane in which the wire feed axis runs when the welding torch is in a horizontal position.

The handle is arranged coaxially to the wire feed axis. When the welding torch is in a horizontal position, the wire feed axis runs in a horizontal plane. Handle and housing part for the drive unit are arranged relative to one another in such a way that the wire is not deflected in the housing of the drive device. When the welding torch is in the horizontal position, the shaft of the drive motor runs in a horizontal plane which is at a distance from the parallel plane in which the wire feed axis runs, and the plane in which the motor shaft runs can be arranged below or above the horizontal plane in which the wire feed axis runs.

In one embodiment, the housing part for accommodating the drive unit is arranged on the front side or end face of the handle. In this case, the group of hoses is attached to the rear end of the handle, and not only the wire electrode but also the supply lines are passed through the handle of the housing part having the drive unit into the torch neck inserted into the end face of the housing part of the drive unit.

In another embodiment, the torch neck is directly attached to the front side or end face of the handle, and the housing part for accommodating the drive unit is located at the rear end or the rear end face of the handle and the group of hoses is directly attached to the housing part having the drive unit.

The spindle of the wire feed roller is preferably arranged either perpendicularly or parallel to the drive shaft of the drive motor.

The drive motor is preferably arranged transversely to the wire feed axis at a distance from it in

the housing part for accommodating the drive unit. It is especially preferred to arrange the drive motor below the wire feed axis. Owing to the fact that there is a distance between the wire feed axis and the wire drive roller and the housing of the drive motor, the gearing for the positive connection between the spindle of the wire feed roller and the motor shaft can be arranged between the wire feed roller and the housing of the drive motor.

In order to obtain a particularly favorable distribution of weight relative to the wire feed axis, it is preferred to arrange the drive motor in such a position relative to the wire feed axis that a perpendicular plane running longitudinally through the wire feed axis intersects the motor shaft of the drive motor in the area of its armature.

The gearing for the positive connection between the shaft of the drive motor and the spindle of the wire drive roller is preferably worm gearing which is arranged between the wire drive roller and the housing of the drive motor. The actual positive connection between the worm shaft and the motor shaft is effected by means of a toothed belt running over toothed pulleys, a toothed pulley being arranged in each case on the worm shaft and the motor shaft.

Instead of a toothed belt, bevel gears can also be arranged on the shafts, which bevel gears produce a positive connection between the worm shaft and the motor shaft.

If the drive motor is not arranged perpendicular to the spindle of the wire feed roller but parallel to it, the positive connection can be produced via meshing spur gears. In this embodiment, the distance between the spindle of the wire drive roller and the shaft of the drive motor is designed to be smaller, since no gearing needs to be arranged in between. The set of spur gears acts as the gearing.

In push-pull systems of this type, the continuously consumable wire electrode is driven at the rear

end of the group of hoses, ie. it is advanced and pulled and fed further in the area of the welding-torch handle by a wire-feed drive roller and a counterpressure roller interacting with it.

5 The housing having the housing part for accommodating the drive unit and the handle is preferably formed from two half shells which bear against one another in a plane running in the direction of the wire feed axis and are screwed to one another.

10 One half shell of the housing part for accommodating the drive unit has an opening which is closed by a lid and permits access to the wire feed roller and the pressure roller.

15 The handle can be equipped with the switch lever for actuating the welding torch in order to be able not only to hold the torch with one hand but also to start the welding torch and initiate and end the welding operation with the same hand.

20 Owing to the fact that, according to the invention, the supply lines and the wire electrode are passed through the handle, and the drive unit consisting of wire feed roller, gearing and motor is arranged with a good distribution of weight relative to the wire feed axis in a housing part adjoining the handle, a particularly easy-to-hold drive unit for electric push-pull torches is obtained.

The invention will now be described in greater detail with reference to the figures.

30 Fig. 1 shows an embodiment of the device according to the invention in longitudinal section from the side.

Fig. 2 shows this embodiment in longitudinal section from above.

35 Fig. 3 and 4 schematically show the arrangement of wire feed roller and drive motor inside the housing part.

In Fig. 1 the housing of the drive device is designated by 1 and has a handle 2 and a housing part 3 for accommodating the drive motor 4 for the wire drive

roller 5 likewise arranged in the housing part 3. Gearing 6 connects the motor shaft 10 of the drive motor 4 to the spindle 7 of the wire drive roller 5. In the embodiment reproduced in this figure, the housing part 3 is arranged 5 on the front side of the handle 2 in such a way that the longitudinal axis of the handle 2 runs through the upper part of the housing part 3 for accommodating the drive unit. The spindle 7 of the wire drive roller 5 runs perpendicularly to the drive shaft 10 of the motor 4. The 10 drive motor 4 is arranged transversely in the housing part 3 below the wire feed axis so that the motor shaft 10 runs at right angles to the wire feed axis in a horizontal plane which is at a distance from the horizontal plane in which the wire feed axis 8 runs. The gearing 6 15 is worm gearing which is arranged between the wire drive roller 5 and the housing of the drive motor 4. A positive connection between the worm shaft 9 and the motor shaft 10 is produced by a toothed belt 12 rotating over toothed pulleys arranged on the shafts 9, 10. The housing 1 is split in the longitudinal direction into two half shells 20 which are held together by screws in the holes 13. The push-button or the lever of the switch (not shown) for switching on and ending the welding operation is designated by 14. The wire electrode (not shown) is passed 25 along the wire feed axis 8 in the same way as the supply lines for the welding torch through the handle 2 and the housing part 3 to the torch neck of the welding torch, which is inserted into the opening 14 arranged on the end face of the housing part 3. In this embodiment, the group 30 of hoses is attached to the rear end of the handle 2.

Fig. 2 shows this embodiment in longitudinal section from above. The wire feed axis 8 runs tangentially 35 to the margin of the wire drive roller 5. The continuously consumable wire electrode is pressed against the wire drive roller 5 by a counterpressure roller 15. The drive motor 4 is arranged in the housing part 3 in such a way that there is as uniform a distribution of weight as possible relative to the wire feed axis 8. A plane running in the direction of the wire feed axis 8

from top to bottom through the wire feed axis 8 intersects the drive motor 4 in the area of its armature winding. Consequently, the weight of the drive motor and of the gearing is distributed as symmetrically as possible relative to the wire feed axis. A toothed pulley 11 is in each case arranged on the drive shaft of the motor 4 and the worm shaft of the gearing 6. The gearing 6 is arranged below the wire feed roller and above the motor housing of the drive motor 4. The torch neck of the electric welding torch is inserted into the opening 14 on the end face of the housing part 3. At the rear end, the handle 2 has an opening 16 for passing through the supply lines and the consumable wire electrode from the group of hoses to be attached.

Fig. 3 schematically shows an arrangement of drive motor 4 and the worm gearing 6 arranged above the drive motor 4 and the wire drive roller 5 lying above the worm gearing 6, the spindle 7 of the wire drive roller 5 running perpendicularly to the motor shaft 10. Arranged on the motor shaft 10 and the worm shaft 9 are toothed pulleys 11 which are positively connected by means of a toothed belt. As shown in figs. 1 and 2, the motor 4 is arranged transversely to the wire feed axis.

Fig. 4 schematically shows another arrangement of drive motor 4 and wire feed roller 5 relative to one another, the drive shaft 10 and the spindle 7 of the wire feed roller 5 running parallel to one another in this embodiment. The positive connection between the spindle 7 and the shaft 10 is here made as gearing via spur gears 17.

Patent Claims

1. Drive device for continuously consumable wire electrodes of electric welding torches, comprising a housing (1) having a handle (2) and a housing part (3) arranged outside the area of the handle (2) enclosed by the hand and having a drive unit arranged therein consisting of a wire drive roller (5) and a drive motor (4) acting on the wire drive roller (5) via gearing (6) and arranged outside the wire feed axis (8) in such a way that its motor shaft (10) runs at right angles to the wire feed axis (8), characterized in that the handle (2) is designed to be coaxial to the wire feed axis (8), and the wire electrode is passed through the handle (2) and the housing part (3), the motor shaft (10) of the drive motor (4) running in a horizontal plane which is at a distance from the parallel horizontal plane in which the wire feed axis (8) runs when the welding torch is in a horizontal position.
10
2. Drive device according to claim 1, characterized in that the spindle (7) of the wire feed roller (5) is arranged either perpendicularly or parallel to the shaft (10) of the drive motor (4).
20
3. Drive device according to claim 1, characterized in that the gearing for the positive connection between the drive shaft (10) of the motor (4) and the spindle (7) of the wire feed roller (5) contains a toothed belt.
25
4. Device according to claim 1, characterized in that the housing part (3) for accommodating the drive unit for the wire electrode is formed on the front side or rear side of the handle (2).
30
5. Device according to claim 1, characterized in that the drive motor (4) is arranged transversely to and below the wire feed axis (8).
35
6. Device according to claim 1, characterized in that the drive motor (4) is arranged in such a position relative to the wire feed axis (8) that a plane running longitudinally through the wire feed axis (8) intersects the motor shaft (10) of the drive motor (4) in the area of its armature.

7. Device according to claim 1, characterized in that the gearing (6) is worm gearing which is arranged between the wire drive roller (5) and the housing of the drive motor, and the positive connection between the worm shaft (9) of the worm gearing and the motor shaft (10) is produced by means of a toothed belt (12) rotating over toothed pulleys (11), a toothed pulley (11) being arranged in each case on the worm shaft (9) and the motor shaft (10).
- 10 8. Device according to claim 1, characterized in that the gearing (6) is worm gearing which is arranged between the wire drive roller (5) and the housing of the drive motor, and the positive connection between the worm shaft (9) of the gearing (6) and the motor shaft (10) is produced by means of bevel gears which are arranged in each case on the worm shaft (9) and on the motor shaft (10).
- 15 9. Device according to claim 1, characterized in that the drive spindle (7) of the wire feed roller (5) runs parallel to the drive shaft (10) of the motor (4), and the positive connection is produced via meshing spur gears (17).
- 20 10. Drive device according to claim 1, characterized in that the housing (1) having the housing part (3) and the handle (2) is formed from two half shells which bear against one another in a plane running in the direction of the wire feed axis (8) and are screwed to one another.
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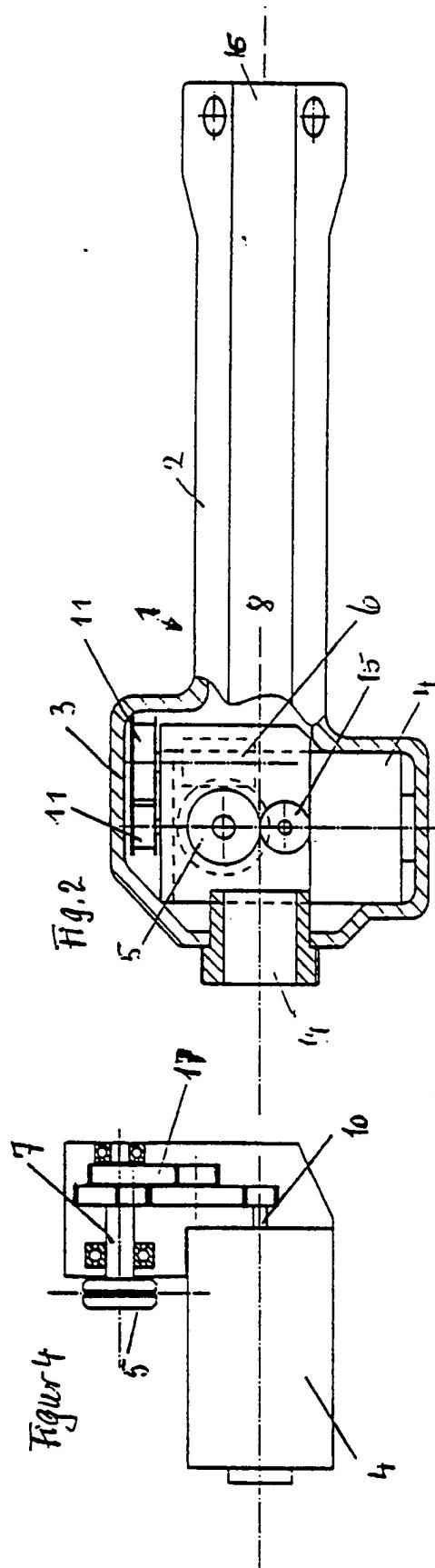
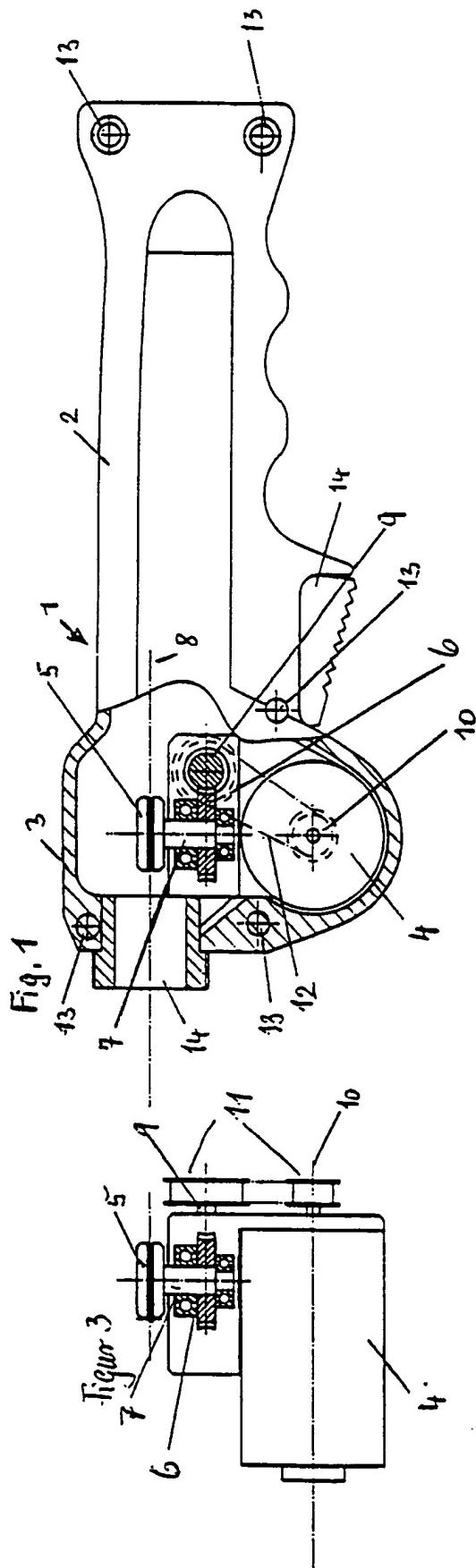
AMENDED CLAIMS

[received by the International Bureau
on 7 August 1991 (07.08.91);
original claims 1 and 4 replaced by
new claim 1; claims 2 and 3 amended;
claims 5-10 replaced by new claims 4-9 (3 pages)]

1. Drive device for continuously consumable wire electrodes of electric welding torches, comprising a housing (1) having a handle (2) and a housing part (3) arranged outside the area of the handle (2) enclosed by the hand and having a drive unit arranged therein consisting of a wire drive roller (5) and a drive motor (4) arranged outside the wire feed axis (8) acting on the wire drive roller (5) via gearing (6) and the motor shaft (10) of the drive motor running in a horizontal plane which is at a distance from the parallel horizontal plane in which the wire feed axis (8) runs when the welding torch is in a horizontal position, characterized in that the handle (2) is designed to be coaxial to the wire feed axis (8), and the wire electrode is passed through the handle (2) and the housing part (3), the housing part (3) for accomodating the drive unit for the wire electrode is formed on the front side or rear side of the handle (2) and the drive motor (4) is arranged in such way that its motor shaft (10) runs at right angles to the wire feed axis (8).

2. Drive device according to claim 1,
characterized in that
the spindle (7) of the wire feed roller (5) is
arranged either perpendicularly or parallel to the
shaft (10) of the drive motor (4).
3. Drive device according to claim 1,
characterized in that
the gearing for the positive connection between the
drive shaft (10) of the motor (4) and the spindle
(7) of the wire feed roller (5) contains a toothed
belt.
4. Drive device according to claim 1,
characterized in that
the drive motor (4) is arranged transversely to and
below the wire feed axis (8).
5. Drive device according to claim 1,
characterized in that
the drive motor (4) is arranged in such a position
relative to the wire feed axis (8) that a plane
running longitudinally through the wire feed axis
(8) intersects the motor shaft (10) of the drive
motor (4) in the area of its armature.
6. Drive device according to claim 1,
characterized in that
the gearing (6) is worm gearing which is arranged
between the wire drive roller (5) and the housing
of the drive motor, and the positive connection
between the worm shaft (9) of the worm gearing and
the motor shaft (10) is produced by means of a
toothed belt (12) rotating over toothed pulleys
(11), a toothed pulley (11) being arranged in each
case on the worm shaft (9) and the motor shaft
(10).

7. Drive device according to claim 1,
characterized in that
the gearing (6) is worm gearing which is arranged
between the wire drive roller (5) and the housing
of the drive motor, and the positive connection
between the worm shaft (9) of the gearing (6) and
the motor shaft (10) is produced by means of bevel
gears which are arranged in each case on the worm
shaft (9) and on the motor shaft (10).
8. Drive device according to claim 1,
characterized in that
the drive spindle (7) of the wire feed roller (5)
runs parallel to the drive shaft (10) of the motor
(4), and the positive connection is produced via
meshing spur gears (17).
9. Drive device according to claim 1,
characterized in that
the housing (1) having the housing part (3) and the
handle (2) is formed from two half shells which
bear against one another in a plane running in the
direction of the wire feed axis (8) and are screwed
to one another.



I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)⁶

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.C1. 5 B23K9/133

II. FIELDS SEARCHED**Minimum Documentation Searched⁷**

Classification System	Classification Symbols
Int.C1. 5	B23K

Documentation Searched other than Minimum Documentation
to the Extent that such Documents are Included in the Fields Searched⁸**III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹**

Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
Y	US,A,2719245 (ANDERSON ET AL.) 27 September 1955 see the whole document	1
A	(cited in the application) ---	2-10
Y	CH,A,462344 (ZENTRALINSTITUT FÜR SCHWEISSTECHNIK DER DDR,HALLE) 31 October 1968 see column 1, line 1 - column 4, line 19; figure 1	1
A	---	2-10
A	FR,A,2107632 (AKTIEBOLAGET BAHCO VERTYG,ELEKTRISKA SVETSNINGSAKTIEBOLAGET) 05 May 1972 see page 2, line 37 - page 5, line 33; figures 2, 3	1, 2, 4-10
A	US,A,4179056 (SCHMERLING) 18 December 1979 see figure 4	1, 3

¹⁰ Special categories of cited documents :¹⁰^{"A"} document defining the general state of the art which is not considered to be of particular relevance^{"E"} earlier document but published on or after the international filing date^{"I,"} document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)^{"O"} document referring to an oral disclosure, use, exhibition or other means^{"P"} document published prior to the international filing date but later than the priority date claimed^{"T"} later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention^{"X"} document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step^{"Y"} document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.^{"&"} document member of the same patent family**IV. CERTIFICATION**

Date of the Actual Completion of the International Search

20 JUNE 1991

Date of Mailing of this International Search Report

12 JUL 1991

International Searching Authority

EUROPEAN PATENT OFFICE

Signature of Authorized Officer

HERBRETEAU D.



**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.**

**EP 9100511
SA 45613**

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on
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20/06/91

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-2719245		None	
CH-A-462344		None	
FR-A-2107632	05-05-72	DE-A, B, C 2145578 GB-A- 1338467	16-03-72 21-11-73
US-A-4179056	18-12-79	CA-A- 1094171	20-01-81